Probing for mitochondrial complex activity in human embryonic stem cells.

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Funding Grants: Role of Mitochondria in Self-Renewal Versus Differentiation of Human Embryonic Stem Cells

Public Summary:
Mitochondria are cytoplasmic organelles that have a primary role in cellular metabolism and homeostasis, regulation of the cell signaling network, and programmed cell death. Mitochondria produce ATP, regulate the cytoplasmic redox state and Ca2+ balance, catabolize fatty acids, synthesize heme, nucleotides, steroid hormones, amino acids, and help assemble iron-sulfur clusters in proteins. Mitochondria also have an essential role in heat production. Mutations of the mitochondrial genome cause several types of human disorder. The accumulation of mtDNA mutations correlates with aging and is suspected to have an important role in the development of cancer. Due to their vitally important role in all cell types, the function of mitochondria must also be critical for stem cells. Key advances have been made in our understanding of stem cell viability, proliferation, and differentiation capacity. But the functional activity of stem cells, in particular their energy status, was not yet been studied in detail. Almost nothing is known about the mitochondrial properties of human embryonic stem cells (hESCs) and their differentiated precursor progeny. One way to understand and evaluate the role of mitochondria in hESC function and developmental potential is to directly measure the activity of mitochondrial respiratory complexes. Here, we describe high resolution clear native gel electrophoresis and subsequent in gel activity visualization as a method for analyzing the five respiratory chain complexes of hESCs.

Scientific Abstract:
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